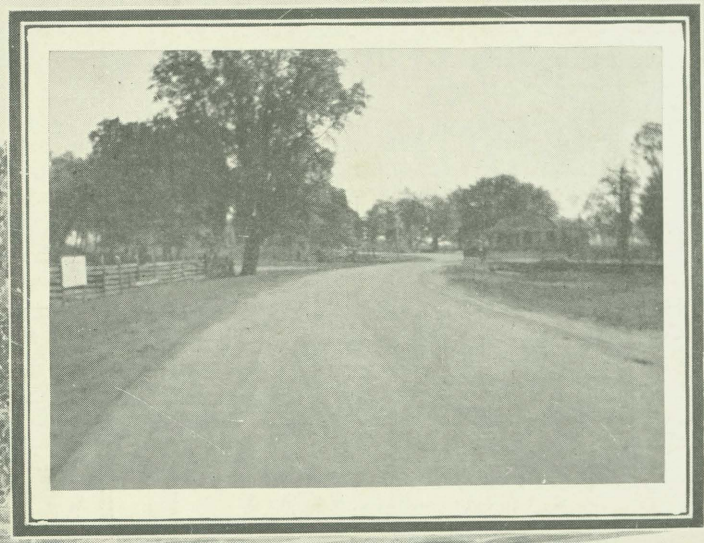
# FLORIDA HIGHWAYS



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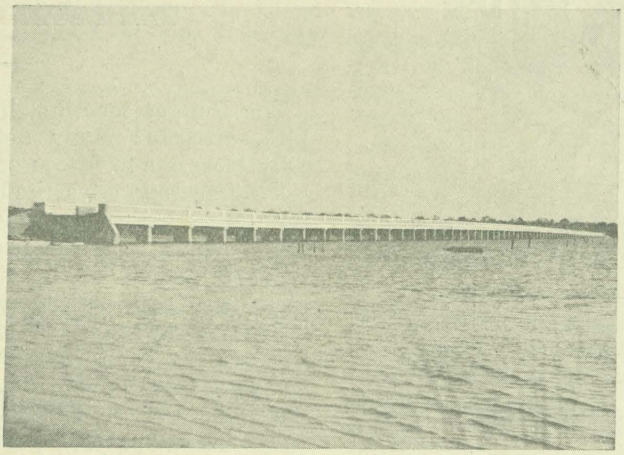
# FLORIDA HIGHWAYS


Vol. 1 APRIL, 1924 No. 5


## Importance of State Highway Publications


By V. D. FULGER, Editor Texas Highway Bulletin.


Address Delivered Before American Association of Highway Officials in New Orleans in December, 1923.

Since the invention of the printing press the public has depended upon newspapers and magazines for information concerning the activities of the outside world and for accurate facts relating to any important public issue. Public sentiment is molded through the news and editorial columns of our daily papers and periodicals. Every publication from the little country weekly with a local circulation to the great dailies with a national circulation has a part to play in the forming of public opinion and in the development of this great country. The press has the confidence of the public and is depended upon for reliable information, but before information regarding any movement can be broadcast, the press must have some way of obtaining this information from those who are in a position to know the facts. Private citizens as well as State and county officials who are interested in, and friendly to any public enterprise, depend upon those who have made a study of the situation, and those who are actually in charge for ammunition which they can use in gaining support for the movement, and in counteracting blind criticism.

It is necessary to engage the interest of the people before any movement of a public nature can be successfully carried on. To engage their interest, you must advertise—you've got to show them that there is a need—and that there are benefits to be derived, then you've got to convince them that your plan of operation is the proper one. You've got to accomplish something and tell them about it; in other words, you've got to sell your idea and keep it sold. Road building and modern highway transport is a new idea and the only way to sell a new idea is to advertise it.

Every important public movement that has been successfully carried on has an official organ. This is necessary, first, because more detail regarding the activities of the organization can be given. Second, because it offers a medium through which accurate facts can be given out without being added to or taken from. Third, because it reaches those most directly interested.

The building and maintaining of a great system of State and National highways is the one big problem before us today. Hundreds of millions of dollars must be raised. To raise this money and to success-


(Continued on Page Four)

# Florida Highways

Published Monthly
Official Publication of the State Road Department





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B. A. Meginniss, Attorney for the Department, Editor and Business Manager

Volume 1 — April, 1924 — Number 5


# EDITORIAL

## THE ORLANDO MEETING

The Budget meeting, held at Orlando on March 14th, attracted many delegations ranging numerically from one to fifteen or twenty.

This meeting, advertised according to law, was held for the purpose of hearing "complaints and suggestions" concerning the proposed budget. It is particularly gratifying to note that not one single complaint was lodged. Suggestions there were, of course, but not one word of criticism concerning the budget proposed by the Department was heard.

Another gratifying feature of the meeting was the spirit in which the delegations approached their subject. Each one seemed impressed with the necessity of presenting his subject clearly, succinctly and briefly; one result of which was that a single day sufficed to hear all delegations desiring a hearing. Another fact which naturally proved distinctly gratifying to the Department was the recognition of the task which confronts the Department in its work and the expressions of approval which were heard.

With such a mass of suggestions to be considered, it is not probable that the Department can announce its final budget for 1924 at any very early date, but those who were heard at Orlando may rest assured that every consideration will be given the suggestions made.

## "TRUNK" ROADS FOR BAGGAGE

(From Chatfield News-Democrat)

That teachers are as limited in their knowledge of public affairs as common mortals is manifest in an interesting answer given by a Minnesota applicant for a teacher's certificate in a recent state examination.

The question and answer were copied verbatim by a St. Peter citizen:

Q. Briefly explain the Babcock trunk highway system in Minnesota and give its importance?

A. The Babcock trunk highway system is a system by which trunks or any kind of baggage may be passed along the highway without getting lost or damaged. This is very important so people can send any kind of baggage on the highway going between cities without it being lost or damaged. This increases the rate of travel along our highways.

How an intelligent and educated young woman could be so colossally ignorant of the most talked of system in Minnesota is a problem for psychologists to explain.

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"Are you sure we have taken the best road?"

"Somebody has. Dreadful thing they left in its place, isn't it?"—Sydney Bulletin.

# Fifth Good Roads Essay Contest to be Held this Year

A 4-year term at college with all expenses paid is the inducement held out to high school students of the United States for the best essay on the subject, "The Relation of Improved Highways to Home Life," according to a statement of the Highway Education Board.

Announcement of this proposal is being made to all state, city and county school officials as promptly as possible. The offer is in the form of a contest, in which all students of high school grade are eligible to compete. The 4 years at college constitute a scholarship given annually by H. S. Firestone, Akron, O., for the best essay on a subject pertaining to elementary highway economics. The contest is the fifth conducted in as many successive years under the auspices of the highway organization.

In the conduct of the contest the board will have the active assistance of extension divisions of the leading universities in each state, or of the state departments of education, as well as the almost unanimous endorsement and support of city and county school authorities.

The rules of the contest are simple. Any student of high school grade is eligible to enter. Essays to be written must not exceed 700 words in length. The closing date on which essays must be presented to school principals is April 21, 1924. Aside from the usual statements that essays must be written on one side of the paper only, must be the original work of the writers, and that the decision of the judges is final, there are no other conditions. A statement reviewing the past history of the contests, said:

For the fifth consecutive year high school students of the Nation are being offered the opportunity to win what is perhaps the largest single educational award offered in the United States.

The award is known as "H. S. Firestone Four Years' University Scholarship," which will be given to the high school student writing the best essay on "The Relation of Improved Highways to Home Life."

Altogether it is estimated that more than 800,000 pupils have submitted essays in the four previous contests, probably the most sustained educational competition, according to the records of the board, in the United States.

Four students are now in college as the result of their participation. The first successful pupil was Miss Katharine F. Butterfield, Weiser, Idaho. She will be graduated this year from Northwestern University, Evanston, Ill. The second to win this national honor was Miss Garland Johnson, Bridgeport, W. Va., now attending the University of West Virginia at Morgantown. A young man was the winner of the third contest, Karl G. Pearson, of Kansas and the District of Columbia, being the successful contestant. His essay was written on the subject, "How Good Roads Are Developing My Community." He is a student at George Washington University, Washington, D. C.

The last winner was Miss Dorothy Louise Roberts, Harlan, Ky., located in the heart of the Kentucky mountains. Miss Roberts, the daughter of a Methodist preacher, wrote the best essay of approximately 150,000 submitted in the 1923 competition on the subject, "The Influence of Highway Transport Upon the Religious Life of My Community." She is attending school at Marietta College, Marietta, Ohio, where her father has been transferred as pastor of a church.

Thus $16,000 already have been appropriated by the donor for the education of young people who have been successful in these competitions. The scholarship this year is precisely as offered in the past, which is intended to defray all expenses incident to tuition, room, board, books and special fees of the successful student at any college or university in the United States he elects to attend.

The character of the judges who review the essays is the highest type possible to obtain. Last year, for instance, the national judges were the Secretary of War, John W. Weeks; Dr. Albert Shaw, editor of the Review of Reviews, New York City; and Bishop William F. Anderson, Methodist Episcopal Church, Cincinnati, Ohio. The board offers assurances that judges of the same repute and high standing will be chosen to make the selection of the best essay this year.

Any information desired on the contest will be very gladly supplied. Inquiries should be addressed to Highway Education Board, Willard Building, Washington, D. C.—Highway Engineer and Contractor.

## COVER PICTURE

The insert on this month's cover is a photograph of State Road No. 1 near Milton in Santa Rosa County. This piece of road, known as Federal Aid No. 14-A, is of brick construction with sand-clay shoulders. It is one of the oldest pieces of hard-surfaced road built under the direction of the State Road Department and the Federal Bureau of Pubilc Roads. Santa Rosa County participated in its construction. It is six miles in extent and has its western terminus at Blackwater Bridge (Project 14-B) which is shown on page 7 of this issue.

The largest class of road user, the owner of the pleasure motor vehicle, has as yet to be sold the salient idea of highway financing. He does not yet realize that roads cost money, that definite policies of construction, maintenance and administration are necessary. He does not realize that he has a vehicle that is dangerous to his fellow man when improperly used. The courtesy of the road has not as yet made its appearance.—Highway Engineer and Contractor.

In 1922, according to the figures from U. S. Bureau of Mines, the production of gasoline in the United States was 6,202,234,613 gallons and the domestic consumption was 5,382,504,177 gallons; the excess of supply over demand being 819,730,436 gallons.

## IMPORTANCE OF STATE HIGHWAY PUBLICATIONS

(Continued from Page One)

fully carry on this movement will require the cooperation of all State and National agencies. It will require organized effort, publicity campaigns and enthusiasm. Public opinion must be courted, and the confidence of the people gained. We've got to sell the public on modern methods of road building and highway transport and then we've got to keep them sold. Officials in charge of this great work have a duty to discharge and they should employ every legitimate means to get the sympathy and cooperation of the people.

In my opinion, no better method of keeping the people informed can be found than through the columns of the State Highway Department's official publication. A publication that has one subject and one motive, the information is first hand and sufficient detail can be given. Newspapers depend upon such publications for editorials and news items affecting highway development. It is an economical means of distributing the information; it adds stimulus to the movement, it offers a medium through which persons engaged in road construction and maintenance can exchange ideas, and through which the Department can send out rulings and instructions to county officials; and it is very helpful in securing the passage of needed legislation.

In 1921 the State Highway Department of Texas had to fight for its existence because the people were not familiar with the activities of the Department and the members of the Legislature didn't understand why there was a need for a State Highway Department. All the information that had been given out came from politicians and misinformed citizens who realized that criticising the Highway Department was a popular issue. No publicity campaign was carried on to counteract these false and exaggerated reports, and the Department had no medium through which it could give out the facts to defend itself, and as a result many members of the Legislature, voicing the sentiment of their people, wanted to abolish the Highway Department. Shortly after that session of the Legislature we started the Texas Highway Bulletin, official organ of the Department. Through this publication and through the press, we've kept the public informed regarding our activities, we've explained in detail any point that we thought was not clear to the average citizen, we've carried our needs to the people; and as a result, the last Legislature doubled the license fees, turning over to the State Highway Department all of the increased fees; passed a 1 cent tax on gasoline, three-fourths of which goes into the State highway fund; placed the maintenance of all State highways under the control of the Department, submitted a constitutional amendment which would have authorized the Department to take over the construction and maintenance of all State highways. Of course, we do not claim that the Bulletin was altogether responsible for this change, but it at least played a prominent part. The papers reprinted our articles and our friends used the information to advantage. In the beginning, in fact for the first year, the Bulletin was gotten out in mimeographed form, because we had no appropriation for this purpose, and because the Highway Commission objected to selling advertising space for fear of adverse criticism. They soon realized, however, that advertising was a part of the various machinery, construction and material companies' annual budget, and that this kind of a publication would give them a good advertising medium for their goods. We figured the cost of publication in regular magazine form and then sold the advertising space at a rate that would cover this cost. As the advertising increases we increase the quality and circulation. We have been publishing the Bulletin in this form for over a year and have increased the size from 28 to 44 pages and the circulation from about 1,500 to about 4,000. Some months we get out more, some less, depending on the amount of space sold.

Publications of this kind are badly needed to keep up the momentum of any new movement, especially if the policy is not definitely established and if the money with which to carry it on must be raised.

The people cannot be blamed for refusing to support something they don't understand; they should refuse. They cannot be blamed for believing false reports when they have no other information to go by. Publicity acts as an antidote for blind criticism that highway departments receive at the hands of politicians and misinformed citizens, and it is a State highway department's duty to give publicity to its activities. The people want and expect it. They are naturally interested and when the actual facts are not made known, they are prone to believe false reports.

The people can be depended upon to do the right thing, when they know what the right thing is. The people should rule and the people will rule. I, unlike some of these modern, mysterious prophets, still have confidence in the people, and the form of government under which this great nation has grown to be the most powerful and most wonderful in all the world. I don't believe the country is going to the Bow Wows or that the reds and foreigners are about to take it over.

Yes, I believe in one flag and one government, and that government is based upon the Constitution of the United States.

The activities of the State Highway Department should be open and aboveboard. Tell the people all your troubles and needs. They will have confidence in you and will cooperate with you.

About half of the States are now getting out an official publication, and some of them are getting out weekly news letters to the papers and all of these States will admit that their publication has been a great help to them in carrying on their program and especially in securing needed legislation.

Of course, the mere fact that the highway department issues a weekly or monthly publication is not sufficient proof that the department will secure the desired results from this form of publicity. Much will depend upon the contents of the publication, the circulation and the manner in which the information is published. A publication of this kind should not be restricted to cold facts pertaining strictly to the subject of highway construction, highway maintenance and the activities of the department. A few good pictures and jokes make any magazine more attractive and readable. Whether or not certain ar-

ticles are read will depend a great deal upon the manner in which they are arranged and the titles given them. Few of us like to sit down these days and read dry articles or instructions pertaining to a subject for which we have no special interest, other than that of a citizen, but if this article is gotten up in an attractive style and well illustrated, we will often read and digest it. If this were not true, it would be just as well for us to have these articles and instructions mimeographed and mailed out to these people.

The contents should include proposed legislation, instructions to county officials, activities of the various counties of the State, rulings of the department, projects advertised, contracts awarded, activities of other States and general news pertaining to the highways of this country, and as I said before, a few good pictures and jokes mixed in with this other information will add greatly to the attractiveness of the publication. Pictures alone often tell a story, and a joke often conveys an idea in a more forceful manner than an article a page long could have. Articles dealing with old historic roads and trails, based upon and giving a resume of the experience of the old trail drivers and frontiersmen creates a desire in the present generation to carry on a program of development in keeping with past experiences and future possibilities of their State and Nation.

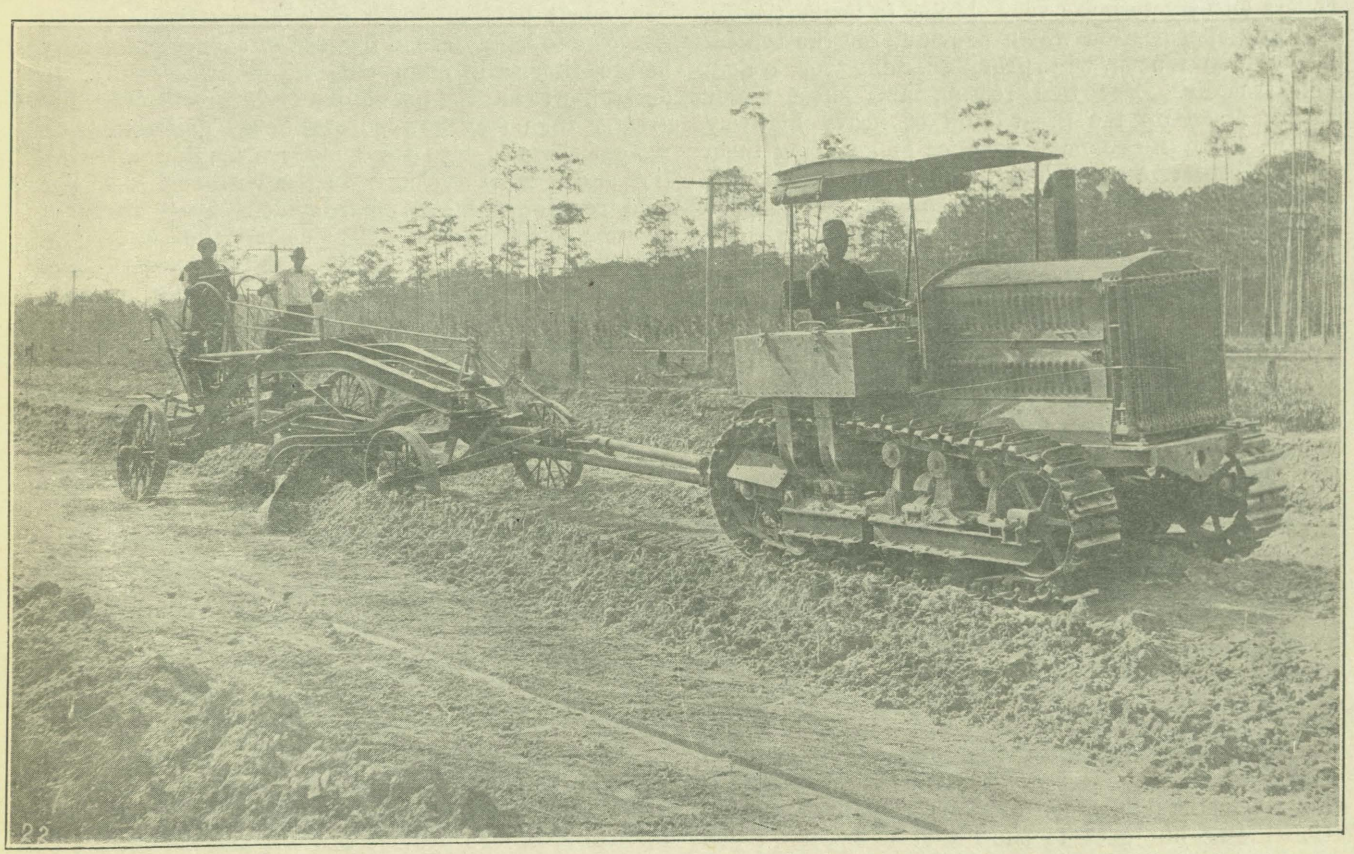
A comparison of old highway laws with modern requirements for highways makes an interesting subject and gives another angle by which you can press needed legislation.

Articles by county officials dealing with the highways under their supervision creates local interest in the department and the highway movement. It also creates a partnership feeling.

Tourist information and articles catering to tourists are not at all out of place in a magazine of this kind. Tourists bring money and prosperity into a State. Articles telling of the pleasure and health resorts, the places of historic interest, and calling attention to the natural scenery boost the State, causes local tourists to see their State first, and has a magnetic effect on out of State tourists.

The circulation should include county and State officials interested and engaged in road construction and maintenance, law makers, newspapers, civic clubs, engineers and contractors, and other interested citizens who make application to receive the publication.

In summarizing the benefits to be derived from State highway publications and stressing the importance of such publication, it seems that there are about five reasons why every highway department should have an official organ, gotten out under its direct supervision. First, it helps to mold public sentiment in favor of modern road building and modern highway transport. Second, it keeps the public informed with reliable information. Third, it reaches those directly interested. Fourth, it is instructive, and fifth, it stimulates interest and study on the part of those actually engaged in the work—American Highways.



Grading on Federal Aid Project No. 24.

# Outstanding Problems in Highway Bridge Design

By E. F. KELLEY Senior Highway Bridge Engineer, U. S. Bureau of Public Roads.

One of the first problems with which the bridge designer is confronted involves the selection of suitable live loads for design. This problem is an important one at the present time, for in this respect highway bridge specifications have not kept pace with the great changes in traffic conditions that have taken place in recent years. An interesting illustration of this fact was brought out in a recent study of state specifications, which showed that 16 states were still using uniform live loads practically identical with those specified for Class B-1 bridges in Theodore Cooper's specifications of 1896. This shows the effect on modern specifications of a specification which was introduced at a time when there was no conception of the extent to which highway traffic would develop, both in density and in weight.

Concentrated live loads which may be considered as producing the most severe stresses in ordinary highway bridges are motor trucks; trucks with trailers; road rollers; steam, gas and oil tractors; steam shovels, cranes and dragline excavators; and military loads. Of these, the various excavating machines and the heavier units of military equipment may properly be considered as exceptional loads, although provision must be made for them. In respect to weight and weight distribution, the heavier road rollers and tractors are very similar to heavy trucks, and any specification which provides for the typical heavy-duty trucks will provide amply for rollers and tractors. For this reason, and since motor trucks make up the great bulk of heavy highway traffic, the quite common practice of adopting them as representative of all heavy equipment is justified.

During the summer of 1921, information relative to a considerable number of truck models was collected, and this material was presented as a portion of the 1921 report of the Subcommittee on Bridges and Structures of the American Association of State Highway Officials. These data show that, under rated capacity loads, 5-ton trucks average about 10½ tons in total weight, and 7½-ton trucks average about 13½ tons. But these are by no means maximum weights, as the overloading of motor trucks is almost universal and overloads ranging from 50 to 100 per cent are not uncommon. Under a 50 per cent overload, 5-ton trucks average about 13 tons in total weight, and 7½-ton trucks about 17½ tons. Under heavier overloads these weights may approximate 15 and 20 tons, respectively.

What may happen in the way of overloading was well illustrated in some recent bridge tests. It was necessary to use heavy truck loads, but no heavy-duty trucks were available. A 3½-ton truck was loaded with gravel until the total weight was in excess of 14 tons, and it was successfully operated for a considerable period of time. This is an exceptional case but goes to show that a 3½-ton truck does not necessarily mean a 3½-ton pay load.

In motor trucks operating under capacity loads an average of about 77 per cent of the total load is concentrated under the rear wheels, and with a 50 per cent overload the average load under the rear wheels is about 80 per cent of the total. The average length of wheel-base is about 14 feet. These figures, which are of importance from the standpoint of design, may well be contrasted with the 10-foot wheel-base and two-thirds of total load on rear axle which are quite commonly assumed in bridge specifications.

Of equal or even greater importance than the determination of present-day requirements is the consideration of what the future may bring forth in the way of increased highway loads. Legislation may temporarily restrict the weights of vehicles, but it will not do so indefinitely if new developments in truck and pavement design make possible the economic use of heavier units. It has already been quite definitely established that the damage to road surfaces depends on the wheel concentrations rather than on the gross weight of vehicle, and in this connection it is well to note the development of six and eight-wheel trucks which may make possible greatly increased gross weights without increased wear on pavements. We are today discarding thousands of old bridges which are still serviceable for the traffic for which they were designed, but which are inadequate for modern traffic. In order that the so-called permanent bridges which we are now building will not have to be discarded for lack of carrying capacity before they are worn out, we must consider, in designing them, the possibility of future loadings far greater than may now be considered probable.

That there is need for a modern loading specification and a more uniform practise with regard to live load requirements, is made evident by a study of existing specifications. Considering the country as a whole, there is undoubtedly need for several classes of loading, but the loads to be used should be based on present and probable future traffic conditions and not on state lines.

### Width of Roadway

The bridge is an integral part of the highway and should be so considered. Theoretically, therefore, the roadway width on a bridge should be the same as on the adjacent highway, so that there will be no restriction of traffic due to the presence of the bridge structure. In the majority of cases it is not practicable to attain this ideal condition on account of cost considerations, and we have come to regard it as a foregone conclusion that the more expensive structures will necessarily impose some restrictions on traffic. Narrow roadways are a menace, and necessary restrictions should be reduced to the minimum practically attainable.

The roadway width should be based on the number of lanes of traffic for which provision is to be made and should be a multiple of the width required for one lane. To provide a width of roadway which is not an exact multiple of the width of a traffic lane is not economical, since the portion of the width in excess of that necessary for a certain number of

whole lanes adds to the cost of the structure without increasing its traffic capacity.

There is some difference of opinion as to the proper width which should be assumed for a traffic lane, and there has been considerable discussion as to whether it should be taken as 9 feet or 10 feet. In my opinion, the correct figure to be used depends on the purpose for which the assumption is made. A width of 9 feet is undoubtedly sufficient for the passage of one line of vehicles, and, therefore, for the determination of design loads, the width of 9 feet should be assumed. Otherwise we shall have 18-foot roadway bridges designed for one line of traffic when actually they will carry two. But a width of 9 feet is somewhat narrower than is desirable from the standpoint of safety and usually will tend to slow up traffic. Therefore, it is most desirable that the actual width of roadway as constructed should be based on the 10-foot traffic lane, thus providing greater safety for fast traffic and reducing the tendency toward traffic congestion.

It may be said that roadway widths for bridges on main highways should be at least sufficient to provide for two lines of traffic. This means that the clear width of roadway must be at least 18 feet and, for the reasons already stated, preferably should be not less than 20 feet. Furthermore, it may be said that, on paved roads, the distance between bridge curbs should be at least as great as the width of the pavement and preferably should be somewhat greater. Otherwise traffic may be somewhat restricted, since a vehicle will not usually travel as close to a curb as it will to the edge of a pavement.

### Bridge Approaches

Intimately conected with the width of the roadway on the bridge itself is the proper treatment of the approaches. Too often the presence of a bridge structure is indicated to the approaching driver only by unsightly, square-ended bridge rails looming up ahead and located well in toward the center of the highway, the approach fill being narrowed to meet the narrow roadway on the bridge. This indication of a restricted roadway without adequate approach protection is, unhappily, not always apparent at night. Such structures are not only an eyesore architecturally, but also an actual menace to traffic. The shoulders of the narrow approach are difficult to maintain at the end of the bridge, and if not maintained add still more to the danger to traffic. They may be widened by means of riprap and should be protected by guardrails converging toward the ends of the bridge. On new structures this condition may be avoided by proper design.

For obvious reasons, the bridge approach should be on a tangent or a very easy curve, and sharp curves should be avoided. An adequate width of approach may be provided by building the abutment wing-walls with horizontal tops for a portion of their length, the horizontal portion being of such length that the approach fill may be maintained at full width to the end of the bridge. The wide approach fill provides for easier maintenance of shoulders and increases the safety of vehicles. In connection with the wide approaches, flaring rails at the ends of the structure give it an improved and finishel appearance, increase its visibility to approaching drivers and serve to prevent vehicles from going over the wings. These flaring rails should extend to the shoulder of the fill or be supplemented by substantial guard-rails.

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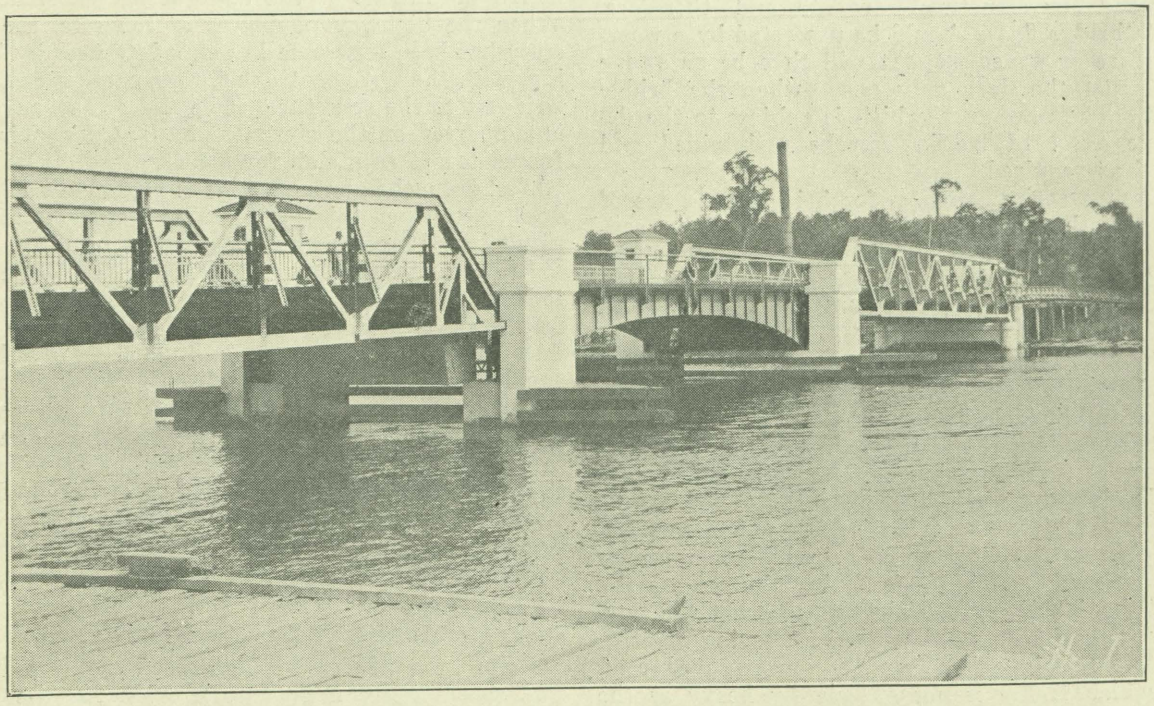


Blackwater River Bridge, Federal Aid Project No. 14-B, Santa Rosa County.

### Bridge Floors

Floors of concrete bridges will, of course, be of concrete. Floors for steel bridges may be of either wood or concrete. The determination of which material shall be used depends upon first cost and maintenance charges. The use of a wood floor will usually result in a somewhat lower first cost, both in the floor itself and, because of its low weight, in the supporting structure. But the maintenance cost is high, both on account of decay and on account of traffic wear. Decay may be partially overcome by preservative treatment, and protection from the wear of traffic may be afforded by some sort of wearing surface. Both preservative treatment and wearing surface are expensive and tend to eliminate much of the apparent advantage in first cost.

We have many thousands of wood-floored steel bridges which are still serviceable, but which are too light to carry anything but the wood floors for which they were designed. Increased traffic has made the maintenance of these floors very expensive and they must be maintained if the bridges are to be continued in service. A very satisfactory method of handling this maintenance problem is the use of laminated or strip floors of 2 by 4's or 2 by 6's laid on edge and spiked together, and protected from wear by a carpet coat of tar or asphalt mixed with gravel or stone chips. This provides a serviceable floor and one which increases the rigidity of light structures. But this situation should be avoided in future construction by making fixed steel bridges capable of carrying a concrete floor, even though it is intended to construct them in the first place with wood floors.

### Wearing Surfaces

The bridge floor has two distinct functions to perform—it must be capable of carrying traffic loads and of resisting traffic wear. It is not desirable to subject to wear that portion of the floor upon which we depend for structural strength and, therefore, concrete bridge floors should be protected by a wearing surface or pavement. It will then be necessary to construct the floor only once—when the bridge is built. The pavement, which is subject to the destructive effect of traffic, can be maintained and renewed as required.

Concrete wearing surfaces for bridge floors are of two types—those placed monolithically with the concrete sub-floor, and those placed separately. The separately placed wearing surfaces are to be preferred, since they furnish a definite line of demarcation between the wearing surface and the sub-floor and thus provide effectively for maintenance and renewal.

In general, it is desirable that the bridge pavement be of the same type as the pavement of the adjacent highway. Of the wearing surfaces other than concrete, brick and asphaltic concrete find their greatest use when the highway paving is of one of these materials. Asphalt blocks are well suited for floors upon which an asphalt surface is desired but where the size of the job is not sufficient to warrant the purchase or use of even a moderate-sized paving plant.

In case a bridge is located on an unpaved road upon which traffic is not sufficiently heavy at the time of construction to make a wearing surface of immediate necessity, the pavement may be omitted temporarily and placed later, when needed for protection or when the highway is paved. In the latter case it may be included in the regular paving program. In all such cases it is desirable that some additional thickness of floor be provided as a temporary monolithic wearing surface and it is essential that provision be made in design for the weight of the future pavement. The proper allowance to be made for the weight of future paving will depend, of course, on the type which is anticipated. It should never be less than 25 pounds per square foot, which will permit the use of a 2-inch bituminous surfacing, and if concrete or brick is to be used it should be at least 50 pounds per square foot.

For bridge pavements the requirements governing quality of materials, care in construction and curing, and accuracy of finish should be, in all respects, at least equal to the corresponding requirements for the highway pavement, of which the brige floor is virtually a part.

### Junction of Bridge With Highway

Theoretically, the junction of the bridge floor with the adjacent highway should be smooth and even and should have as good riding qualities as any other portion of the road. Actually, this condition is difficult of attainment because of the settlement of approach fills and the necessity of providing expansion joints at the ends of structures. The design of expansion joints which will perform their function without introducing objectionable features in the roadway surface is a difficult matter. Innumerable types of joints have been used, but the ideal joint is yet to be devised.

The settlement of approach fills introduces a complication which is particularly difficult to overcome on unsurfaced roads or those surfaced with a non-rigid type of pavement. In these cases only the most careful maintenance will prevent objectionable and dangerous humps at the ends of bridge structures. When the highway paving is of concrete, the difficulty has been overcome in many instances by bridging, with the pavement itself, that portion of the fill adjacent to the structure. The end of the pavement is supported on the abutment back-wall and is reinforced to act as a slab for a distance of from 10 to 20 feet from the abutment. If appreciable settlement does occur when this construction is used, it will not result in a dangerous hump.

In some instances, serious damage has been done to bridge structures by the creeping of concrete pavements. When this action takes place, there are introduced forces of greater magnitude than any bridge can be expected to withstand. To provide for this condition, diagonal expansion joints have been placed in pavements near bridges, with the idea that any longitudinal movement of the pavement will force it to move transversely along these joints and thus prevent the enormous pressure from being transferred to the bridge. I do not know that any such installations have been in place long enough to demonstrate their effectiveness.

### Protection of Structures and Traffic

Before the advent of high-speed motor traffic it was considered sufficient to provide for the safety of vehicles on structures. Now we must not only make this provision but must also protect our struc-

tures, particularly our truss spans, from traffic accidents.

It is only recently that the need for this protection has become apparent, but now our bridges are being wrecked in ever-increasing numbers, with consequent loss of life and property. Trusses are the most vulnerable and have been the chief victims of these accidents. Their adequate protection from injury or total destruction is a new problem for highway bridge engineers, and a most important one.

The accidents which have occurred indicate that the structure must be afforded protection for its entire length, since spans have been wrecked by collisions with web members as well as with end posts. Two methods have been suggested as a means of affording this protection. The first of these is the use of skid beams such as are used on railway bridges; the second is the construction of curbs high enough to stop a truck. Both methods have their disadvantages. One is that neither is very well adapted to use on existing structures. Another is that both will probably detract from the appearance of the structure.

The two principal requisites of any protection which may be furnished are, that it shall be supported independently of the truss members which it is to protect, and that it shall be strong enough to stop a motor vehicle.

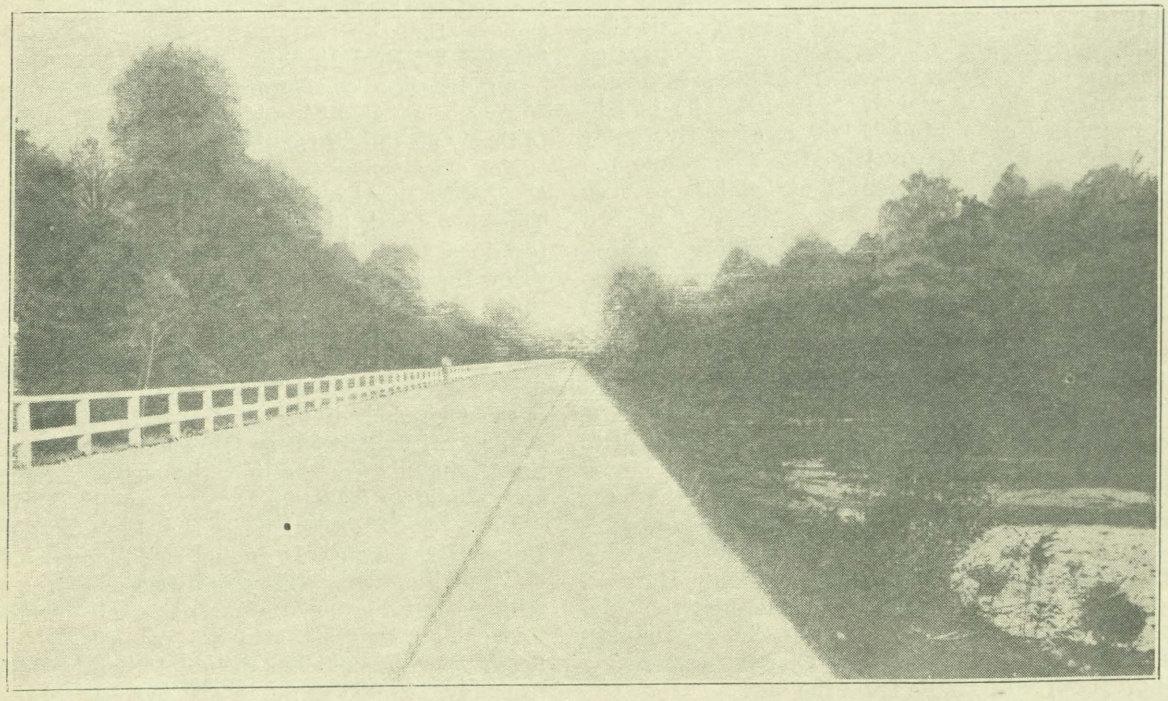
Of the two methods which have been suggested, it seems that protection by curbs offers the greater possibility of satisfactory development. But it is scarcely applicable to bridges not floored with concrete and can probably have little use on existing structures, since it will usually result in a narrowing of the roadway unless provision for this detail has been made in the original design. The curb should be at least 15 inches and preferably should be not less than 18 inches high. Its inside face should be at least 12 inches from the clearance line of the truss members. By flaring these curbs at the ends of the structure and extending them out onto the approach fill or pavement, the end posts may be protected from vehicles approaching the bridge.

In the case of existing structures, when it is not feasible to protect the web system, the ends of the bridge may be protected from approaching vehicles by massive masonry posts.

In addition to affording positive mechanical protection, any device which may serve to direct traffic and to clearly define the roadway and the traffic lanes will be of benefit. Marking traffic lanes by painted lines on the roadway surface and painting railings a light color are effective.

From the humanitarian standpoint, the protection of traffic is more important than the protection of structures, and we have altogether too many serious accidents due to the lack of this protection. Traffic protection is not so simple as it was in the days of light vehicles and low speeds, and it is necessary to provide more adequate safeguards than have been furnished in the past. The protection of the bridge approach has already been mentioned. On truss bridges any adequate protection of the structure itself will safeguard traffic. On other bridges, particularly those of the deck type, substantial curbs and rails are necessary. Flimsy rails, which will not withstand great punishment before failure have no place on modern bridges.

Acknowledgment.—From a paper read before the American Road Builders' Association, Chicago, January, 1924.



Federal Aid Project No. 7, Road No. 2—Fill Approach to Alapaha River Bridge, Showing Alignment of Guard Rail.

# The Conners Highway Through the Everglades

Such is the title of one of those remarkable ventures that at times almost startle us by their bold originality. An up-to-date rocked and asphalted road some seventy-five miles long, through the heart of the Everglades to the shores of that magnificent inland sea Lake Okeechobee, thence south along its eastern shore some twelve miles to Bacom's Point, and north from the Point where the Palm Beach Canal enters the lake some thirty-five miles to Okeechobee City, is now building and probably sixty per cent completed.

To construct seventy-five miles of good tar road sixteen feet wide over a level country under ordinary conditions is no great or expensive task, but to build such a road as this over slimy wet muck from eight to sixteen feet deep for probably forty miles of the entire distance, involves expenditures of unknown amounts and so many unlooked for obstacles, unforeseen by even the most experienced engineers and constructors, that the simple contemplation of such a task would discourage any ordinary man.

### W. J. Conners, the Man

However, W. J. Conners, of Buffalo is not an ordinary man. Mr. Conners has a career which is typically American. When 13 years old he started work on a steam boat. At the age of 28 he launched into business for himself as a freight contractor. Early in his career he apparently recognized the importance of road-building in this country, as in 1888 he engaged in the asphalt and street paving business. In 1895 he started his career as a publisher, acquiring the Buffalo Inquirer and two years later the Buffalo Courier.

In 1916 he organized the Great Lakes Transit Corporation and bought all the railway and operated steam ships on the Great Lakes. Then his eyes turned southwards to the Everglades. In 1917, he bought and commenced reclaiming 17,000 acres of Everglade land, which land is now cultivated to sugar cane and fruit. It is this development that led him to even greater things.

The uncertainties of this road-building project, when summed up, remind one of Mr. Flagler's sea-going railroad from Miami to Key West, started in 1905 and finished in 1913, twice almost washed away by tropical hurricanes and the money cost of which no one ever dared to even mention. Men of sufficient capital and vision to undertake such projects are seldom met with and no Hall of Fame is needed to perpetuate their memories.

Briefly stated, this road is a continuation of the Okeechobee Road or military trail which now runs twenty miles west of Palm Beach on the north side of and parallel to the Palm Beach Canal. Here we come to a swing bridge, and from there on the Conners Road runs on the south side of the canal almost in a due northwest line to Lake Okeechobee, passing the new sugar mill a mile from the lake.

On reaching Lake Okeechobee the road splits as before mentioned, one branch going south and one north, along the shore of Okeechobee City thirty-six miles. More than two-thirds of the distance the rock dredged from the bed of the canal by four dipper dredges is placed on the soft mucky banks, and after settling is gone over again till the grade is reached, and it is then leveled off both by machine and hand labor and finally covered with a heavy coating of asphalt.

The dredges work continuously night and day with three eight-hour shifts, and in spite of heavy rains and flood conditions every effort is being made to fulfill the promise that December 1 will see the completion of this bold project.

Along the Lake shore the fill is being built by dragline excavators, and a large rock crushing plant capable of putting out one thousand tons a day of crushed and washed rock is operating at the Lake end of the St. Lucie Canal, and an industrial railroad with numerous cars and three locomotives will distribute this rock north and south of the crusher plant till the work is finished.

### Dragline and Shovel Operation

The dragline work is being done by five small dragline excavators, three of which are gasoline operated, and the two latest additions to this outfit being steam machines with oil-burning equipment under the boilers. These last two machines were installed in June. They are Bucyrus 20-B combination shovels and dragline excavators.

With shovel equipment these machines are being used for excavating loose rock, a soft limestone which has been cast into the spoil bank from the canal which runs alongside, by dipper dredges. This rock is crushed and used for paving the roads. To suit the shovels for this service they are equipped with ¾-yard YZ steel dippers.

As dragline excavators they are equipped with 35-foot booms and ¾-cubic-yard buckets and are used to throw up the fill for the road.

Not over a year ago a man went to W. J. Conners to borrow money to build a road to Palm Beach. The idea struck him favorably, and Mr. Conners determined to do it himself, and from that time on he threw the whole weight of his money and energy into the project.

When Mr. Conners was in Jacksonville recently he was quoted as saying that he had just taken over contract for the construction of the 8 miles of road between Okeechobee City and the Kissimmee River to connect with his road at Okeechobee and carry it to the Highlands County line, the contract figure being approximately $200,000.

In a recent interview in the Jacksonville Times-Union, Mr. Conners is quoted as follows:

"The highway will cost between two and three millions but the enterprise does not seem foolhardy to me. I estimate that there are 150,000 people in north Florida, 300,000 people in west Florida and probably 150,000 more in southern Florida. These people will travel, communication must be established between these sections, and the toll road which I am building is an important means by which the State

can be traversed. All of the grading for the thirty-mile stretch between Canal Point and Okeechobee City has been completed and the rock will be put down within a short time. Railroad tracks have been laid, and I have six gasoline locomotives operating over this line to carry rock, machinery and other equipment for the completion of the road. The work was started on May 1 and will be finished by December 15."

Ultimate completion of the road is thus not far off and the shores of Lake Okeechobee, and incidentally the whole lake, will be approachable as never before, and it will be possible to connect up with the outside world in as many hours as it formerly took days.

No truer description of Lake Okeechobee was ever printed than that found in the encyclopedia—"Nearly all the shores of this famous lake are impenetrable swamp and jungle and the Lake itself almost inaccessible." Those who for the past twenty years have gone through the greatest hardship to reach this place, and settle on the lands are, of course, those who most appreciate the value of Conners Highway.

Lack of transportation both for passenger and freight service has up to now held back development of the rich trucking lands along the Lake shore. Only those who have lived on the borders of this wonderful sheet of pure fresh water twelve hundred square miles in extent can form any idea of its beauty and freshness under all varying conditions. Its salubrious climate and remarkable freedom from mosquitoes is the wonder of all who have lived there the year round.

It is said to have a big future as a pleasure resort, threatening indeed in its popularity the most famous resorts of the South.

The W. J. Conners Highway Department has its headquarters at West Palm Beach, Florida.

We acknowledge our indebtedness to the Manufacturers Record which, on October 11th, published an interesting article on this work by Robert Ranson of West Palm Beach.—The Excavating Engineer.

## POLICING THE PUBLIC HIGHWAYS

(From the Highway Engineer and Contractor.)

With the growing number of motor cars and trucks that are taking advantage of the constantly increasing mileage of good roads—and demanding more—it has become as necessary to police the country highways as it is the city streets. State laws now take as much cognizance of the vehicle traffic and highway maintenance as do the city ordinances governing streets and guiding traffic.

That majority of motorists responsible for disregard of the rights of others and the type of bandit that has sprung into existence with the popularity of the better highway must be disciplined. Overloading of motor trucks must be continually guarded against and many other matters for the safety and comfort of the highway traveler must be looked after by competent monitors.

A growing number of States have made provision for the patroling of public highways by regularly constituted police who are more in the nature of State officers with jurisdictions on all highways within the district to which they are assigned.

## PRECEDENTS

One day, through the primeval wood,
A calf walked home, as good calves should,
But made a trail all bent askew,
A crooked trail, as all calves do.
Since then two hundred years have fled,
And I infer, the calf is dead;
But still he left behind his trail,
And thereby hangs my moral tale.
The trail was taken up next day
By a lone dog that passed that way;
And then the wise bell-wether sheep
Pursued the trail o'er vale and steep,
And drew the flock behind him too,
As good bell-wethers always do.
And from that day o'er hill and glade,
Through those old woods a path was made;
And many men wound in and out,
And dodged and turned and went about,
And uttered words of righteous wrath
Because 'twas such a crooked path.
But, still they followed—do not laugh—
The first migrations of that calf,
And through this winding woodway stalked
Because he wabbled when he walked.
This forest path became a lane
That bent and turned and bent again;
This crooked lane became a road,
Where many a poor horse with his load
Toiled on beneath the burning sun
And traveled some three miles in one.
And thus a century and a half
They trod the footsteps of that calf.
Each day a hundred thousand out
Followed the zigzag calf about,
And o'er this crooked journey went
The traffic of a continent.
A hundred thousand men were led
By one calf, near three centuries dead,
And followed still his crooked way
And lost a hundred years a day.
For such reverence is lent
To well-established precedent.
A moral lesson this might teach,
Were I ordained and called to preach.
For men are prone to go it blind
Along the calf paths of the mind;
And work away from sun to sun
To do what other men have done.
They follow in the beaten track,
And out, and in, and forth, and back,
And still their devious course pursue
To keep the path that others do.
But how the wise old wood-gods laugh
Who saw the first primeval calf!
Ah! many things this tale might teach,
But I am not ordained to preach.

—Anonymous.

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A new motor car is being built which can move sideways. Later, as pedestrians become more scarce, it is hoped to invent one which, like a snake, will fascinate its prey, so that they can't move.—London Opinion.

# Latin-Americans Coming to Study Our Highway Movement

Forty Latin-Americans of broad experience in highway affairs are to be invited by the Highway Education Board to come to the United States for a "shirt sleeves" study of every angle of the American highway movement. These representatives will be conducted early next summer on a three weeks' trip through several of the more progressive highway states. The trip will be planned so as to give the visitors a chance to learn first-hand what our vast experience in highway building and highway transport has taught us.

The idea of inviting these men to come here was suggested by arrangements that are being made for a Pan-American motor highway conference. This conference was sanctioned at the Fifth International Conference of American States held in March, 1923, at Santiago, Chile. The proposed motor highway conference will be convened late in 1924 at a place yet to be designated.

This trip of a large group of influential Latin-Americans is certain to be a wonderful stimulus for highway development in all of the countries represented. It also will renew a vast amount of interest here in highway construction, maintenance and operation. A very direct and immediate reaction favorable to highways affairs in the United States thus is expected to result at a time of great importance.

### Government Officials Co-operating

Officials of different United States government departments, co-operating with representatives of several lines of American industry, have worked out the general plan for the trip. They also have put their organizations effectively behind it.

The Department of Commerce is officially taking part in the development and execution of it. Secretary Hoover has taken a personal interest in the movement and has designated J. Walter Drake, Assistant Secretary of Commerce, to represent that department. Mr. Drake has had extensive experience in highway affairs and particularly in highway traffic here and abroad. Dr. Julius Klein, Chief of the Bureau of Foreign and Domestic Commerce, also is co-operating with his organization.

Thomas H. MacDonald, chief of the Bureau of Public Roads, has been prominent in the plan from its inception.

Dr. Hubert Work, Secretary of the Interior, has offered the co-operation of the several bureaus in his department. Dr. John J. Tigert, United States Commissioner of Education, as Chairman of the Highway Education Board will be actively connected with the project.

Dr. Leo S. Rowe, Director General of the Pan-American Union, has approved the general plan for the mission. He also is advising on various details and will assist in welcoming the visitors. He has further offered the use of the beautiful Pan-American Building as headquarters during the brief stay of the delegation.

Since finance is one of the major problems in building highways, the cordial support extended by the Inter-American High Commission will be specially helpful. Dr. G. A. Sherwell, secretary general of that commission, has advised continually on the plans for the trip.

While the plan has unqualified government support, it has been decided to make the invitations unofficial. On account of the difficulty of securing a government appropriation, decision has also been made to have the trip privately financed and managed.

The Highway Education Board will not only extend the invitations but will also have charge of the development and execution of the plans. It has done noteworthy work during its three years and has close contact with the government departments and bureaus actively co-operating to make the trip a success. Various important private industries also are in harmony with this board.

With this general background in mind, it is evident that practical results will depend on these three principal factors: 1. The executives who have direct charge of the project. 2. The manner in which the representatives of the Latin-American countries are selected. 3. The manner in which the trip is arranged and conducted.

S. T. Henry will take the executive responsibility for the project. He was for some years on the editorial staff of "The Engineering Record" before its consolidation with the "Engineering News." He has traveled in the principal Latin-American countries studying their methods of highway building; he is a member of the executive committee of the American Road Builders' Association, and for two years has had charge of its publicity. Mr. Henry will be assisted by Dr. W. C. John from the office of the United States Commissioner of Education, who also is secretary of the Highway Education Board.

### Selection of Delegates

The number of delegates invited will depend on the size, population, amount of local interest in highway improvement and similar factors. A minimum of one delegate from each of the 16 countries will be invited. From each of the larger and more important countries a total of three or four will be asked. Their selection will be determined here. In making the selections advantage will be taken of the knowledge of resident Americans of local conditions in the several countries. Local native representatives of the interested American industries also will be asked to advise.

The ministers of Latin-American countries stationed at Washington make up the governing board of the Pan-American Union. That board has appointed a subcommittee to recommend how the Union can co-operate in making the trip productive of the largest results. The Union has approved recommendations made by the Pan-American Highway Commission's executive committee that the delegates will

be recognized by the Governing Board of the Pan-American Union as the preliminary program committee of the Pan-American Motor Highway Conference which is to be held in one of the South American countries late in 1924.

The trip will be strictly a field study of American highway practice. The delegates will assemble at Washington. Not more than two days will be spent there, during which time the delegates will have a chance to become acquainted with the organization and facilities of the Bureau of Public Roads and visit the testing grounds and the experimental roads of the bureau.

The itinerary will be definitely settled later. Thomas H. MacDonald, Chief of the Bureau of Public Roads, has agreed to select the states in which active operations will be in progress on roads of the types that will be of the most practical interest. In deciding, special consideration will be given to the climatic, soil, topographic, population and financial conditions of the countries represented by the delegates. Among the states under consideration are Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, North Carolina, Ohio, Tennessee and Wisconsin. Conditions in the highly developed industrial states are such as compared with conditions in the Latin-American countries that it does not appear desirable to visit them. It was found that the delegates could not spare the time necessary to reach the extreme western states.

### How the Tour Will Be Conducted

As an example of how the tour will be conducted the tentative plans for visiting North Carolina are: The delegates will proceed by train from Washington to Raleigh. There they will see the plant and organization of a state which is building all types of road on an extensive scale under conditions ranging from subtropical swamps to high mountains. After a day in Raleigh, the party will start in motor cars across the state. The route to be followed will be carefully studied in advance to insure that the delegates will see the maximum kinds of highway construction in progress.

Men thoroughly familiar with American road building practice, who also speak Spanish, will accompany the party. The North Carolina State Highway Commission has volunteered to furnish men to explain to these interpreters special features of design and of methods of construction and maintenance.

Full descriptions in Spanish of the more important types of roads, methods of maintenance and character of traffic will be furnished daily. These will be profusely illustrated. It is expected to take four days to make a trip across North Carolina. From the western part of North Carolina the party will go by train to the Middle West. There the trip in motor cars will be resumed through two or three states. The party then will visit Chicago and Detroit. In the latter city they will be given opportunity to see something of the magnitude and character of the American automotive industry.

The final plans may be changed considerably as to the territory covered but the idea of an intensive field study along the lines mentioned will be closely followed.

The plan for the trip was first discussed at a meeting of a few government officials and representatives of industries held in Washington early in October. The broad vision behind the plan was quickly recognized at this preliminary meeting. The decision was made then to hold, at New York, on Nov. 22, a larger but not all-inclusive meeting of various people interested. This New York meeting was attended by about 40, including government officials, bankers, industrial representatives and engineers.

Assistant Secretary of Commerce Drake presided. After the plan was fully discussed the meeting unanimously endorsed the plan and elected as an executive committee: Chairman, Roy D. Chapin, chairman of the board of directors, Hudson Motor Co., Detroit; Fred I. Kent, vice-president, the Bankers Trust Co., New York; W. T. Beatty, president, Austin Mfg. Co., Chicago. This committee was empowered to take the necessary steps to finance the expenses of the trip and to proceed to handle the project.—Highway Engineer and Contractor.

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## LONDON MAINTAINS QUIET WITH RUBBER PAVING BLOCKS

Noise of London traffic at the cenotaph, Britain's war memorial at Whitehall, has led to special means for insuring silence at the spot to which thousands from all parts of the empire make a pilgrimage. The surrounding area has been laid with rubber pavement, the cost of the block, estimated at $30,000 being paid for as a gift to the country by Rubber Roadways, Ltd. The superficial area of the strip paved with rubber is 1,500 sq. yds., stretching across the Whitehall carriageway and extending half way to Downing street on the Westminster side and an equal distance towards Charing Cross. Each block weighs nearly 5 lbs. and measures 8 by 4 by 3 ins.

This experiment in rubber paving has not been wholly successful, however, as the following taken from the report of the Westminster city engineer would indicate:

"Considerable movement has taken place in the block since they were first laid, and the spaces thus formed have been temporarily filled with wood block. It is suggested that this wood should be removed and replaced with rubber paving of rectangular, straight-faced block, tightly wedged up, that the bad patches around the boxes should be relaid, and that two or three portions of the foundations which appear to be damaged should be made good."

As more knowledge is gained by experience it is probable that the present defects in rubber pavements will be eliminated.—Highway Engineer and Contractor.

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The first Act for paving the streets of London was passed in 1532. In the same year a similar Act was passed for paving the streets of Paris.

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The Appian Way, the first paved road ever constructed, was built by Appius Claudius, and led from Rome to Capua. This road marked the beginning of Rome's remarkable system of highways.

## TRUCK USERS ARE PENALIZED

### A. A. A. President Calls Retention of One Transportation Tax and Removal of Others Inconsistent

"Members of Congress who are willing to drop all war taxes on transportation and communication, yet leave it on new automobiles, parts, accessories and tires, are thoroughly inconsistent," said Mr. Thos. P. Henry, President of the American Automobile Association, who is in Chicago attending the motor show.

"The Ways and Means Committee has recently recommended dropping war taxes on yachts, candy and moving picture admissions," said Mr. Henry. "Taxes have already been dropped on transportation because Congress realized the extent of the additional burden in the cost of distribution if these war taxes were continued. However, if a shipper today turns from railroad transportation to truck transportation, as he often does, in the latter case he immediately runs up against an additional cost of doing business in that the government taxes him on every new part, accessory and tire he buys. This is unjust discrimination and should not be continued."

Mr. Henry pointed out that every farmer taking merchandise to market has to figure this extra cost of doing business. "It is as inconsistent to continue this tax," said Mr. Henry, "as it would be to tax the railroads 5 per cent for every new box car they built, for every new part to a locomotive, for every new part purchased for a Pullman. That is exactly what happens to the trucker and motorist who already is subjected in many instances to a dozen different kinds of taxation incident to his ownership of a car or truck.

"With the enactment into law of the recommendation of the Ways and Means Committee for the repeal of the war tax on telephones and telegraphs, the war excise tax on motor vehicles will stand out as being the only war tax on transportation," said Mr. Henry. "Failure to make a beginning in the removal of the last of war transportation taxes surely cannot be due to a lack of appreciation by Congress of the necessity of the motor vehicle for transportation purposes. There is the anomalous situation of certain shippers patronizing the Pennsylvania railroad, being relieved of the war tax on rail transportation by a previous Congress, now called on indirectly to pay a war tax on the transportation of their goods. The Pennsylvania Railroad the other day discontinued two daily package car freight trains operating between Philadelphia and Wilmington and hired motor trucks to haul their freight. All shippers of freight by motor truck must directly or indirectly pay this war exercise tax on transportation.

"It is almost inconceivable that Congress before it adjourns will fail to give partial relief at least, for the 15,000,000 motorists who are paying a tax which is discriminatory as a whole, a nuisance tax in so far as it is applied to accessories, and a tax on misfortune when the automobile owner is required to pay the tax on repair parts," said Mr. Henry. "The American Automobile Association is asking that a beginning be made at this Congress as evidence of the determination of Congress to remove all war excise taxes on transportation. Failure to do this will lend color to the claim that Congress does not want to give up this discriminatory tax on motor vehicles on account of the large revenues which are derived each year from this source. That the motorist is the most taxed individual of any class of tax payers, paying from 11 to 15 special taxes is due to the fact that the motor vehicle owner has been looked upon as the logical victim whenever money is needed by various taxing units. The American Automobile Association is asking that the Federal Government set the example of fair treatment of the automobile owner to the other taxing units.

"The Association is asking that the war excise tax imposed for revenue raising purposes in 1918 be removed in 1924, when such a tax is no longer required," concluded Mr. Henry.

Convicts Spreading Marl on Road No. 2 in Charlotte County.

## COST PER MILE OF CANADIAN ROADS

An idea of the average cost per mile of different types of Canadian roads may be gained from the accompanying tabulation. The figures given are for standard roads of the Provincial Highways System; cost of smaller, "local" road being proportionately lower:

| Width in Ft. | Type of Surface | Average Cost Per Mile |
|---|---|---|
| 22 | Improved earth road | $ 2,000 to $ 2,500 |
| 20 | Gravel road | 6,000 to 7,000 |
| 16 | Oiled, water-bound macadam | 12,000 to 14,000 |
| 16 | Bituminous macadam | 20,000 to 22,000 |
| 16 | Concrete | 25,000 to 30,000 |

—Engineering News-Record.

## ROADS CREDITED WITH PUTTING STATE FORWARD

North Carolina has been recently instanced by a prominent writer as one of the most outstandingly progressive of the southern states. A good share of this progress is attributed to good roads.

In the eastern part of the state, there are two county seats that formerly were 115 miles apart. Now the distance between them is barely 15 miles. This is one of the miracles of modern road-building.

The two county seats of course are right where they have always been and the air-line distances between them is unchanged. But, whereas in the old days to get from one to the other it was necessary to make a roundabout journey of considerably more than a hundred miles over roads that were passable only in good weather, now it is but a jaunt that a flivver will make in a few minutes on a gallon of gas, thanks to a bridge a cause-way and a few miles of up-to-date highway that have been constructed.

This is cited as an example that is typical of the progress that is being made by a state that ranks 27th in area and 14th in population.

One of the notable fruits of the state's educational progress has been the better roads movement, and in turn good roads have facilitated school developments, agricultural advances and the growth of the tourist business. Time was when there was scarcely a decent highway in North Carolina, and during many months of the year the roads in many sections were absolutely impassable. Children could not get to school. Farmers could not market their crops. The state was anathema to tourists. Moreover, there was the bad effect of mire and mud on the morale of the rural population—something altogether appreciable but not to be measured.

However, in 1921 Governor Morrison made the drive that led to the adoption of a statewide highway policy. The general assembly authorized the issuance of bonds to the amount of $50,000,000 for road construction and enacted the necessary legislation for the taking over of 6,200 miles of highways, 2,500 of which will be hard-surfaced and 3,700 built of durable rock and soil substance. Last year an additional $15,000,000 was authorized for this work, which is now nearing completion. Every county seat has been connected and trunk lines now connect North Carolina with the adjoining states.—Michigan Roads and Pavements.

## FEDERAL AID FUNDS AVAILABLE

By providing an appropriation of $17,700,000 for Federal-Aid highways during the coming fiscal year, the Committee on Appropriations of the House of Representatives has approved the amount requested for that purpose. This amount is all that is necessary, when added to unexpended funds already appropriated, to provide $85,000,000 which it is estimated is all that can be expended during the next fiscal year. If the road program should proceed more rapidly than is anticipated, further funds could readily be made available by bringing in a deficiency appropriation bill. The status of federal aid funds as prepared by the appropriation committee is as follows:

| | |
|---|---|
| Total of appropriations available to the States since 1917 | $392,817,500.00 |
| Paid to the States, Dec. 31, 1923 | 284,380,339.58 |
| Balance, Jan. 1, 1924 | $108,437,160.42 |
| Estimated expenditure during remainder of fiscal year 1924, at the rate of $6,000,000 per month (6 months) | 36,000,000.00 |
| Estimated balance, June 30, 1924 | $ 72,437,160.42 |
| Appropriation recommended for 1925 in the accompanying bill | 13,000,000.00 |
| Plus unexpended balance on hand, June 30, 1924 | 72,437,160.42 |
| Total available for expenditure during the fiscal year 1925 | 85,437,160.42 |
| Estimated expenditure during fiscal year 1925 | 85,000,000.00 |
| Estimated balance, June 30, 1925 | $ 437,160.42 |

—Engineering News-Record.

## ROAD BRIEFS

According to Cone Brothers, contractors, now building the new West Shore Boulevard, extending from a point on Memorial Boulevard about three miles west of the city limits, through Beach Park, Sunset Beach, the Hillsborough county end of the Gandy bridge, Port Tampa City and extending across the lower peninsula to near Gadsden's Point and thence north to Bayshore Boulevard, the section of the new highway between Beach Park and the Gandy bridge will be completed and ready for use in about one month. At present the road is only open for travel through Beach Park, though the grading has been completed for practically the entire distance to the Gandy bridge. The new boulevard is of asphalt block construction, with cement curbs and gutters.—Tampa Tribune.

R. L. Kanipe has the contract for clearing and grubbing the Dixie Highway north of town to Rose Bay, a distance of seven and three-fourths miles. The right-of-way will be sixty-six feet wide and will be paved to a width of eighteen feet. Everything will be cleared from the right-of-way; however, exceptions will be made, and the rare and beautiful trees will be left when they do not interfere with traffic. The road will be straightened wherever it is possible to do so. Mr. Kanipe started last week, and has a good force of men at work. It will take about three months to complete the work.—New Smyrna Breeze.

At the meeting of the county commissioners, last Friday, it was voted to expend the sum of $50,000 for oiling roads in Palm Beach county. County Engineer C. H. Holtslaw was instructed to prepare specifications for the oiling of all hard-surfaced lateral roads in the county, with the extension of the Ocean Boulevard from Boca Ratone, southward to its end. The estimated cost of the work is $50,000. Bids will be opened for the work on March 5. All hard-surfaced roads, between the Ocean Boulevard and the Dixie Highway are to be oiled.—West Palm Sun.

## SOME SIGNIFICANT FIGURES

Here are some figures which explain the growing demand for good road construction throughout the United States and are convincing proof that the demand will continue for many years to come. Thirty years ago there were approximately 300 motor vehicles in the United States. At the present ratio of increase, there will be 16,000,000 of them in another year. The following figures showing registration each year during the 10-year period from 1913 to 1923 tell the story:

| | |
|---|---|
| 1913 | 1,200,000 |
| 1914 | 1,700,000 |
| 1915 | 2,400,000 |
| 1916 | 3,500,000 |
| 1917 | 5,100,000 |
| 1918 | 6,100,000 |
| 1919 | 7,300,000 |
| 1920 | 9,100,000 |
| 1921 | 10,400,000 |
| 1922 | 12,500,000 |

Concurrent with this amazing development in the use of automobiles, road building has become one of the greatest industries in the United States. The latest estimate, compiled by Thomas H. McDonald, Chief of the United States Bureau of Public Roads, shows that during 1923 approximately 40,000 miles of surfaced roads were completed. About one-sixth of this mileage was pavement, about one-ninth macadam, one-half gravel and the remainder sand-clay and top-soil roads.

According to Mr. McDonald, the Federal Aid Highway system, which will shortly be approved in its entirety, is indicative of the determination of the American people to have a highway system consistent with the demands of the traffic. The system will include nearly 180,000 miles of the most important roads of the United States, so located as to form a complete network of main interstate and intercounty roads. When completed, it will tie together practically every city and town of 5,000 population or greater, and a 10-mile zone on each side of the roads will include the homes of 90 percent of the people. To encourage the early completion of this system, all Federal appropriations will hereafter be spent only on roads that form a part of the system.

To keep up with the demand for good roads will take a billion dollars a year for some time to come. Another billion dollars a year, we are told, will be expended by the railroads to keep up with the demands of commerce. The outlook for the earth-moving industry was never brighter. There should be work for every contractor and a fair profit.—The Earth-Mover.

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The early Roman roads were so perfectly constructed that soldiers could travel as much as twenty miles a day over them.

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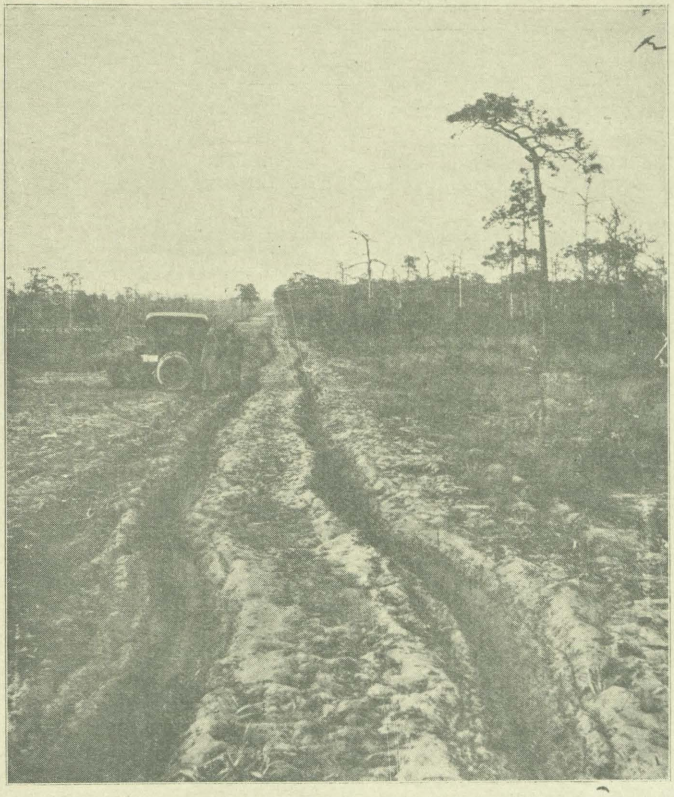
The Greeks paved their roads with square, rather than polygonal blocks of stone.



Samples of Conditions Encountered by the State Road Department Before Commencing Road Construction

A Hard-surfaced Highway has Replaced the Horrors Shown in Each Instance.

# Status of Road Construction

THROUGH JAN. 31ST, 1924.

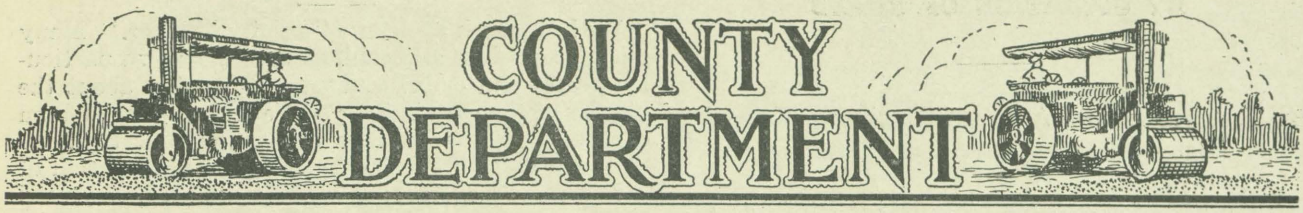
| Proj. No. | Contractor. | Road No. | County | Type | Total Length | Pct. Complete |
|---|---|---|---|---|---|---|
| 18 | Morgan-Hill Paving Co. | 3 | Putnam | B.M. | 12.8 | 99.0 |
| 27-AB | C. F. Lytle. | 2 | Columbia | C. | 12.36 | 64.19 |
| 32 | State Forces | 4 | Nassau | B.M. | 10.0 | 83.5 |
| 34 | Union Indemnity Co. | 7 | Escambia | C. | 10.0 | 41.5 |
| 35 | Hancock Bros. | 1 | Escambia | C. | 5.0 | 78.7 |
| 36-A | H. L. Clark & Sons. | 4 | St. Lucie | B.M. | 7.76 | 52.0 |
| 36-B | C. F. Lytle. | 4 | St. Lucie | C. | 7.12 | 5.0 |
| 37-A | F. W. Long & Co. | 2 | Alachua | S.A. | .70 | 0.0 |
| 37-C | F. W. Long & Co. | 2 | Alachua | S.A. | 3.26 | 15.0 |
| 37-D | Fla. Drainage & Const Co. | 2 | Alachua | G.&D. | 2.14 | 0.0 |
| 37-E | Wm. P. McDonald Const. Co. | 2 | Alachua | S.A. | 7.96 | 14.7 |
| 40-A | C. F. Lytle. | 4 | Brevard | R. | 16.17 | 0.0 |
| 40-D | J. Y. Wilson. | 4 | Brevard | R. | 6.72 | 0.0 |
| 40-E | Langston Const. Co. | 4 | Brevard | R. | 13.6 | 0.0 |
| 501 | State Forces | 6 | Calhoun | S.C. | 44.0 | 91.0 |
| 503 | State Forces | 2 | Charlotte | G.&D. | 8.7 | 85.0 |
| 504 | State Forces | 1 | Columbia | G.&D. | 9.15 | 95.0 |
| 505 | State Forces | 2 | Columbia | S.C. | 11.8 | 75.0 |
| 507 | Barber-Fortin Co. | 4 | Flagler-Volusia | R. | 10.0 | 60.0 |
| 515 | State Forces | 20 | Jackson | S.C. | 15.0 | 96.0 |
| 518 | County Forces | 29 | LaFayette | G.&D. | 15.0 | 0.0 |
| 519 | State Forces | 5 | Manatee | B.M. | 3.5 | 15.0 |
| 521 | Morgan-Hill Paving Co. | 4 | Nassau | R. | 12.41 | 0.0 |
| 523 | M. J. Cole (County Funds) | 8 | Okeechobee | B.M. | 8.75 | 67.91 |
| 532 | State Forces | 3 | Volusia | B.M. | 18.32 | 99.0 |
| 533 | State Forces | 1 | Suwannee | S.C. | 13.47 | 100.0 |
| 534-A | J. D. Donahoo & Sons. | 24 | Brevard | R. | 2.65 | 30.0 |
| 534-B | Noll & Noll. | 24 | Brevard | R. | 11.81 | 40.0 |
| 536 | County Forces | 1 | Gadsden | S.C. | 5.5 | 88.0 |
| 539 | County Forces | 5 | Marion | R. | 11.3 | 12.8 |
| 544-A | F. S. Whitney. | 5 | Pasco | R. | 8.75 | 6.86 |
| 544-B | Barber-Fortin Co. | 5 | Pasco | R. | 11.33 | .005 |
| 545 | Broadbent & Groeting. | 5 | Hernando | R. | 9.51 | 8.8 |
| 553 | State Forces | 2 | Marion | R. | 9.15 | 7.9 |
| 554 | Barber-Fortin Co. | 4 | Brevard | R. | 5.0 | 80.0 |
| 560 | State Forces | 6 | Calhoun | S.C. | 20.0 | 57.0 |
| 562-A | Southern Surety Co. | 8 | Highlands | G.&D. | 5.37 | 24.7 |
| 562-B | W. P. Kennedy Const. Co. | 8 | Highlands | S.A. | 10.71 | 39.0 |
| 564-A | County Forces | 5 | Charlotte | G.&D. | 10.88 | 0.0 |
| 564-B | Boone & Wester. | 5 | Charlotte | G.&D. | 10.31 | 61.0 |
| 565 | State Forces | 1 | Madison | S.C. | 15.64 | 40.0 |
| 570 | Morgan-Hill Paving Co. | 5 | Manatee | B.M. | 3.96 | 58.4 |
| 571 | Hunter & Gladwell. | 1 | Madison | S.C. | 14.73 | 5.0 |
| 572 | L. M. Gray. | 13 | Bradford | R. | 7.0 | 0.0 |
| 572 | State Forces | 13 | Bradford | G.&D. | 7.0 | 99.0 |
| 574 | State Forces | 9 | Madison | S.C. | 11.66 | 14.0 |
| 575 | State Forces | 3 | Putnam | R. | 5.46 | 10.0 |
| 576 | S. T. Buchanan & Son. | 5 | Sarasota | G.&D. | 5.68 | 0.0 |
| 577 | County Forces | 19 | Taylor | G.&D. | 9.732 | 58.3 |
| 579 | State Forces | 1 | Holmes | S.C. | 8.62 | 26.0 |
| 584 | Noll & Noll. | 24 | Osceola | Brick | 2.0 | 87.3 |
| 586 | State Forces | 1 | Jackson-Wash'ton | S.C. | 17.37 | 19.0 |
| 589 | County Forces | 5 | Lee | R. | 8.27 | 24.0 |
| 594 | State Forces | 13 | Bradford | G.&D. | 9.095 | 71.5 |
| 594 | L. M. Gray. | 13 | Bradford | R. | 9.095 | 0.0 |
| 596 | State Force, Carried as Maint. | 10 | Leon | R. | 3.0 | 30.0 |
| 597 | J. Y. Wilson. | 4 | Volusia | R. | 16.24 | .0277 |
| 598-A | Walter J. Bryson. | 1 | Jefferson | S.C. | 9.45 | 4.0 |
| 598-B | | 1 | Jefferson | S.C. | 8.03 | 0.0 |
| 599 | M. M. Boyd. | 2 | DeSoto-Charlotte | G.&D. | 7.10 | 0.0 |
| 604 | C. F. Lytle. | 4 | Volusia | R. | 7.72 | 0.0 |
| 605 | State Forces | 8 | Polk | R.S. | 21.0 | 0.0 |
| 607 | State Forces | 13 | Bradford | G.&D. | 5.10 | 19. |
| 607 | L. M. Gray. | 13 | Bradford | R. | 5.10 | 0.0 |
| 608 | State Forces | 4 | Brevard | R. | 9.29 | 4.0 |

## TOTAL MILES COMPLETED

| | Conc. | Brick | S. Asph. | Bit. Mac. | Rock | Sand-C. | G. & D. | Total |
|---|---|---|---|---|---|---|---|---|
| Completed Dec. 31, 1923 | 66.31 | 24.35 | 57.23 | 137.40 | 50.49 | 237.35 | 175.25 | 757.38 |
| January, 1924 | 2.31 | .546 | .776 | 1.37 | 8.81 | 7.436 | 2.756 | 24.004 |
| Total Dec. 31, 1924. | 68.62 | 24.896 | 58.006 | 138.77 | 68.30 | 244.78 | 178.006 | 781.384 |

Note—The above tabulation shows only those projects that are actually under construction at the present time, and does not show projects that have been previously completed. However, the table, "Total miles completed," at the foot includes all projects that have been completed prior to January 31st, 1924, and the amount completed in January also.. The abbreviations used are as follows:

C—Concrete. S.A.—Sheet asphalt. B.M.—Bituminous macadam. R.—Rock base. S.C.—Sand clay. G. & D.—Graded and drained.




# Features of the Construction of the Gulf Beach Highway, Pensacola

By CHARLES E. PARKER, Speed-Parker, Inc., Contractors, Louisville, Ky.

Pensacola itself is situated on the wonderful harbor of Pensacola Bay and, aside from this body of water, the city has the advantage of many bayous and lagoons, all of which afford bathing beaches and wonderful fishing grounds. Still there was no opportunity to reach the Gulf of Mexico for the enjoyment of surf bathing otherwise than by boat rides. There was a trail leading to the Gulf beach and at times there had been an attempt to make this a clay-surfaced road, but the country through which it was laid was hard of approach. The ground is sandy and swept by the winds of the Gulf of Mexico, so that with an inadequate amount of money the clay road had never been a success. During this delay of many years, some people of foresight and vision had dreamed of some day having a permanent road, one that would attract tourists and offer the opportunity of settlement on their Gulf beach which would prove attractive to outside capital.

### The Project

The Gulf Beach Highway starts about three miles outside of Pensacola, branching off from a concrete pavement known as the Barrancas Road, and the contract consisted in laying a new road in practically virgin territory. Along the entire route there was scarcely a house, and the few plantations were rather poor and unprofitable, though in many places the soil is rich and dark and will grow vegetables and Satsuma oranges most profitably.

The proposed location of the road during its construction was changed several times in order to secure the best scenic effect, and the final layout was arrived at through the care and attention of the engineers in charge, who made it border lagoons and bayous, takiing advantage of all ridges and high ground to improve the scenic charm of the highway.

The construction contract was awarded to Speed-Parker, Inc., engineers and contractors of Louisville, Ky., and the road was built under the direct supervision of R. D. Orders, Vice-President and Manager of this company, and J. P. Herndon, Engineer and Secretary of the company, both resident on the job throughout its entire construction.

### Starting Construction

The first work on the road was to extend the electric railway line out of Pensacola 1½ miles and then build a high track with a tunnel dump, establishing one unloading place for the whole project about ¾-mile from the first stake. Then an industrial railway was laid for the rest of the distance, approximating 12 miles. The industrial road was laid with standard rail and wooden cross-ties.

The country is low and sandy, and where material was trucked and teamed forward for culverts and bridges ahead of the industrial haul, almost insuperable difficulties were encountered, proving conclusively that the industrial haul was the only method of economically constructing this highway.

Sand and gravel were obtained from points near Flomaton, Ala., and were brought in by rail to Pensacola, switched by the electric line to the contractor's unloading point, then dumped in the tunnel construction and reloaded onto batch boxes which were ready to start on their long haul to the mixer.

It was intended to roll the subgrade of the road with 5-ton or even 10-ton rollers. These machines were brought into the country, but proved impracticable because of the deep sand. It was found that a much better subgrade could be procured by settling with water. Fortunately the water supply was very adequate. Numerous small streams, lakes and ponds were available, and in stretches where these were impractical water could be obtained through wells at a depth of not over 12 to 15 feet. The carrying forward of pumping equipment increased in difficulty as the road progressed, and finally two fire engines were procured and because of their ease of transportation solved the difficulty admirably.

### The Pavement Itself

The pavement was of the highest type of concrete construction, using a 1:2:3 mix reinforced with 45 pounds of galvanized steel mesh, with ¾-inch round bars placed at each expansion joint 30 feet apart. The pavement was 5½ inches thick at the edges and 7½ inches thick at the center. Heltzel steel forms were used for lining up the sides, and every 30 feet expansion joints were installed, using steel tem plates conforming to the crown of the road and slightly beveled to make it easy to lift them the day following placing.

One-half of the work was done with Atlas Portland cement brought from Leeds, Ala., and the remainder

(Continued on Page Twenty-One)

## AUTOMOBILE OPERATING COSTS AFFECTED BY CONDITION OF ROADS

By J. T. Madison, Assistant Engineer, Kentucky Highway Department, Frankfort, Ky.

From the reports on 60 Ford cars operated by the Kentucky Highway Department during 1922 and 1923, a study of the effect of road conditions on the cost of operation and upkeep of automobiles was recently made. This was done to determine how much less it cost to operate an automobile over a good road than over a poor one. The cost of operation and upkeep includes all expenditures for gasoline, oil, tires, repairs, renewals, and storage; other items constituting legitimate charges against the automobile were included under these headings.

Under good roads were included all high-type pavements, waterbound macadam and gravel in a reasonably good condition. The total miles traveled by the 36 Ford touring cars operating over these roads was 170,794; the total cost for operation and upkeep was as follows:

| Item | Cost | Percentage of Total Cost |
|---|---|---|
| Gasoline | $2,907.57 | 36.34 |
| Oil and grease | 526.51 | 6.58 |
| Tires | 745.80 | 9.32 |
| Repairs | 3,031.85 | 37.91 |
| Storage | 787.39 | 9.85 |
| Total | $7,999.12 | .... |

*Average cost per mile excluding storage $0.0422.

Poor roads include unimproved earth or rock roads, such as are found in many counties of eastern and western Kentucky. Many of these are impassable to automobile traffic during some of the winter months. There were 24 Ford automobiles of the touring type reported under this heading. They operated a total of 98,246 miles at a total cost as follows:

| Item | Cost | Percentage of Total Cost |
|---|---|---|
| Gasoline | $2,308.68 | 31.43 |
| Oil and grease | 557.33 | 7.59 |
| Tires | 792.55 | 10.79 |
| Repairs | 2,951.06 | 40.17 |
| Storage | 735.39 | 10.02 |
| Total | $7,345.01 | .... |

*Average cost per mile excluding storage $0.0672.

It is found from the average cost per mile for the two classifications of roads that traveling over poor roads costs $0.0250 per mile in excess of that over good roads.

When making comparison between percentages for any item such as gasoline, under the headings of good and poor roads, it must be remembered that nearly twice as many miles were traveled on good as on poor roads, so that the average cost per mile for gasoline on good roads was $0.017 and on poor roads $0.023. —Engineering News-Record.

## DIGNITY OF THE ROAD BUILDER

We hear much about the "dignity of labor." Many other professions and callings have their own particular graces and embellishments. But what about the dignity of the road builder? We seldom hear such an expression in the ordinary transmission of thoughts and ideals which govern the everyday information of the world. Nevertheless when mentioned, the road builder enjoys dignity of no low degree. Centuries ago the inhabitants of Thebes wished to disgrace Epaminondas because he had failed in an attempt to capture the City of Corinth, so they elected him telearch, or street cleaner. Thereupon Epaminondas rebuilt, ornamented, and beautified the streets until he raised the position of telearch from one of ill repute to that of the highest dignity in the city. H. G. Wells selected the six greatest men in the history of the world, and one of the reasons he gave for leaving the name of Alexander the Great off the list, was because with all his great conquests and brilliant victories, he had failed to establish any good roads. John Tyler at his retirement from the Presidency of the United States, had fallen so low in the scale of popularity that his neighbors elected him road overseer in his home precinct. The law at that time empowered the overseer to call out the farmers to work the roads whenever he saw fit. To the surprise of all, Tyler accepted the job, and worked the roads with such frequency and energy that he developed the best roads in the county. Two years ago a great American statesman said in speaking to the young men of Lincoln, that the safest, sanest, strongest and soundest principle for a politician to advocate was this, "A hard road to every farmer's door in America." So it is that he who buildeth a good road is greater than he that taketh a city.—North Carolina Highway Bulletin.

## DIXIE HIGHWAY DIRECTORS TO MEET AT SAVANNAH, GA., MAY 21-22

This year's meeting of the directors of the Dixie Highway Association will be held at Savannah, Ga., May 21, 22, according to an announcement made from National Headquarters at Chattanooga, Tennessee, by Judge M. M. Allison, President. The selection of Savannah as the place for the annual meeting was made by the Executive Committee of the association at a recent meeting, at which time it was also decided to recommend to the board the election of two additional directors from each state represented in the association, with the exception of Tennessee. All of the states have three representatives on the board at present, with the exception of Tennessee, which has ten, North Carolina which has two and South Carolina which has one. This will, if the recommendation is approved by the board of directors, bring the total for Michigan, Illinois, Indiana, Ohio, Kentucky, Georgia and Florida up to five, with four for North Carolina and three for South Carolina.

Sarasota county is the latest to vote for good roads. In an election held Tuesday, the vote was five to one for a $590,000 bond issue for highways and bridges. The roads to be built include a connection with the East Coast.—Tampa Tribune.

## FEATURES OF THE CONSTRUCTION OF THE GULF BEACH HIGHWAY

(Continued from Page Nineteen)

with Dixie Royal cement. The sand and gravel were of high quality, and it is the opinion of the engineers on the project that the subgrade could not have been better and that this highway will probably require no maintenance other than shoulder work for many years to come. The first part of the road today is 1½ years old and from zero station to the end of the project on the road completed it is impossible to find a crack or check in the pavement. There were two small bridges to construct and numerous swamps to negotiate but with all the fills made of sand and with a perfectly watered and settled subgrade and the pavement bearing on sand with the pressure equal throughout its bearing surface, it is reasonable to believe that there will be no cracks in the road for many years to come.

### Construction Equipment

Seven-ton Whitcombe and Burton industrial locomotives were used for motive power, with Lakewood cars and batch boxes for carrying the material. A 21-E gasoline Foote mixer with boom and bucket and derrick attachment was used throughout the entire project for mixing and placing the concrete. Reinforcing steel, railroad iron, gas and oil, as well as all extra supplies whenever possible, were carried forward to the work on flat cars ahead of the locomotive, in an attempt to minimize any truck or team haulage through the deep sand. The finish of the road was accomplished with a Lakewood finisher, which proved very satisfactory.

As the points of operation stretched farther and farther away from the loading point, it became necessary to load as much material as possible at night. Then by running one or sometimes two locomotives, material could be on hand for the morning start each day. The need of this can be readily understood when one considers that in the last miles of the road practically three hours was consumed for a round trip between the mixer and the loading track for a single train. As a rule, the material going to the mixer was relayed, one engine operating between the plant and the first switch for a distance of about three miles. The second engine returned its empties and picked up the train at the switch to carry it forward to its three-mile terminus. This was found more efficient practice than to send a train the whole distance from plant to mixer.

The construction of the road was never particularly rapid, but every effort was made to maintain a steady progress. The supply of sand and gravel at times was inadequate during construction. There were delays from railroad strikes, car shortages and bad weather. The stipulated time for the completion of the road at its commencement was 360 days. This time was prolonged about 90 days, but all penalties due to the delay were promptly waived by the County Commissioners, who were at all times in close touch with the contractors, working in harmony with them, realizing their difficulties and delays, and extending the most cordial assistance. The final cost of construction of the highway was $412,000.

The completion of the Gulf Beach highway is pronounced a creditable achievement. Credit is due to the engineers, Winston E. Wheat and Charles W. Douglas, who gave their services, but much more than their services, in the conception, planning and execution of this highway. The County Commissioners for Escambia County are Frank J. Riera, Jeff M. Herdington, H. E. Gandy, T. T. Wentworth, Jr., and L. S. Gilmore.—Contractors' and Engineers' Monthly.

## LONGEST CONCRETE HIGHWAYS

What state has the longest stretch of continuous concrete highway?

Statistics from the different states in the Union places Wisconsin in the lead with ninety-three miles, followed by Minnesota, Iowa and California in the order named.

Colorado is tenth on the list, with a thirty-five-mile stretch extending from the city limits of Denver toward Greeley on the Lincoln Highway.

This hard surfaced roadway passes through the towns of Brighton, Ft. Lupton and Platteville. The concrete street pavements in these towns maintain the unbroken chain to a point nineteen miles south of Greeley. Here the chain is broken with a sixteen-mile stretch of unpaved road which connects with the three miles of concrete highway extending south from the city limits of the latter city.

The first pavement upon this highway was constructed during 1918 for a distance of two miles. The ever-increasing amount of heavy traffic upon this road is largely responsible for the rapid strides made during succeeding years in providing a permanent link in a north-and-south state thoroughfare.

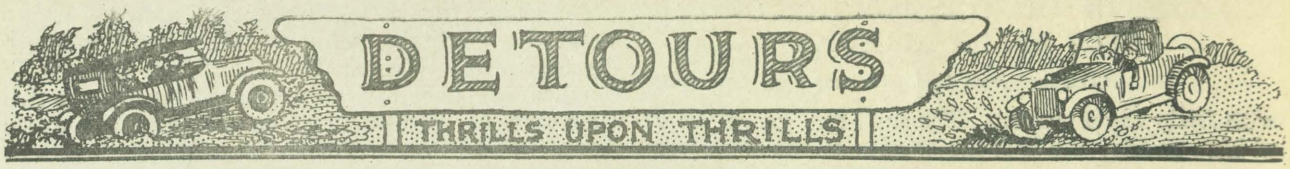
On a continuation of this highway south of Denver to Colorado Springs, twelve miles of concrete pavement have been installed, eight miles extending to a point south of Littleton, while the remaining four miles commences at the city limits of Colorado Springs and runs north to Breed. Contracts have been awarded for a five-mile extension of the former pavement.

There are at present one hundred and fifty-one miles of concrete-paved highways in the State of Colorado.

Listed below are thirteen of the longest continuout routes of concrete-paved highways in the United States:

| State | Road | Length Miles |
|---|---|---|
| Wisconsin | Troy Center through Milwaukee Co. to Fond du Lac | 93 |
| Minnesota | Anoka to Belle Prairie | 83 |
| Iowa | Charles City to Algona | 78 |
| California | Yuba City to Chico | 60 |
| Delaware | Lewes to Dover | 60 |
| California | Chico to Red Bluff | 60 |
| Minnesota | Duluth to Eveleth | 56 |
| Minnesota | Westmoreland to Indio | 54 |
| Florida | Jacksonville to Lake City | 43 |
| Colorado | Denver to Greeley | 35 |
| Arizona | Phoenix to Buckeye | 33 |
| California | Edom to Banning | 30 |
| Maine | Portland to Lewiston | 23 |

—Georgia Highways.




## Y'AUTO TRY THIS ON YOUR CHASSIS

'Twas a dark and Willys-Knight, so the fearsome tale begins, when Columbia and Allen took a Stroller down a Hyatt-Quiet lane.

A limpid Moon arose over the peaceful Commonwealth. Afar off, a Star appeared in the filmy maze of the celestial firmament and a zippy Comet added a touch of the ethereal to the scene.

The maid was an Auburn-haired Beauty-six. She was a social Climber of true American type. Her lover was a speedy kid, a veritable Dixie Flyer, as it were, but he had a passionate Case on her.

A direct line descendant of the prominent Du Pont family, he took the Liberty to hang on like a Leach and, so far, stood Ace high in her affections.

As they strolled along, basking in the mellow rays of the Moon (repeated by request), his heart ticked a rhapsody with his Elgin and he grew emboldened.

"Wouldst Grant me a Kissel?" he tremulously asked.

"You make me Lafayette," she retorted as she curled her nether lip in scorn.

"Have Mercer on me," pleaded her swain as he Nash-ed his Peerless teeth in impotent rage. "I'm a cad, I know, but what, pray tell me, does a Cadillac?"

He was a Champion bull-thrower and his honeyed tones caused him to Dodge the issue, and once again our Hanson hero stood Ace (same as above) high.

"Let's Ford yon stream and see where the Chevrolet," he suggested. You could see he was a Cunningham, even if his grandfather was only a common Gardner.

Gaining the other side of the Jordan, the stricken pair sought a resting place on the closely-clipped greensward. But, horrors! Our hero sat down on a Wasp. He thought it was a Pierce-Arrow in his Stearns. He arose like a Meteor. He cried aloud in his anguish for Porter, but, being near Cleveland, he had to be satisfied with a Piedmont.

"If I was a Texan," he snarled in high dudgeon, "I'd sick a Ranger on that durn bug and I'll wager he'd soon learn to Revere me a little more."

And, unmindful of the Standard character of his Essex, our disgruntled hero made a Dort for the Shacke as the Crow (Elkhart) flies, singing a sweet Carroll as he fled. He never stopped till he reached the banks of the Hudson, gleaming in the moonshine—I mean moonlight.

"Holmes the place for me, after all," he sighed as he dashed Overland.

"Maibohn sure does ache," wailed our Premier hero. And here we shall leave the hapless Roamer.—Paul W. Reed in "Ohio Motorist."—Auto Sparks.

### Page the Mortician

Driver (rounding a corner on two wheels)—You didn't know I could drive a car, did you, old man?

Old Man (ageing rapidly)—N—n—no. Can you?—Punch.

### Discovered

Recently, Dr. Oppitz went to town in his new Ford and to prevent his radiator from freezing he spread a coverlet over the entire front of his car. A small boy standing near began to laugh and said, "Ain't no use to cover it now, I've seen the name."—Exchange.

### Heard in Missouri

"What style of machine do you drive?"

"A detouring car!"—Kansas City Star.

The car stood on the muddy road
Spinning wheels but moved no load
The driver yanked, tore out the clutch,
And now the wheels don't spin so much.
—Texas Highway Bulletin.

### Statistically Speaking

A man went into Cohen's Book Store and asked: "Have you a copy of 'Who's Who and What's What,' by Jerome K. Jerome?"

Cohen replied: "No, sir, but ve got 'Who's Who and Vat's He Got,' by Bradstreet."

**Sad But So.**—Most men who lie, also swear, says a contemporary. Anyhow it's true about a man lying under an automobile.—Colorado Medicine.

"Is the Motor-car an Asset to the Church?" asks a weekly paper. One theory is that it brings a good deal of business to the churchyard.—Punch, London.

There's an automobile for every 3.2 persons in the State, but too often the .2 person is the driver.—San Diego Union.

**Complete Arrangements.**—"Crimson Gulch hasn't parking space enough to accommodate the automobiles that come to town.

"No, sir," answered Cactus Joe. "This here is a growing community with expenses to meet. If we can't ketch a flivver for speedin' we get it fur standin' still."—Washington Star.

**Absolutely.**—At a lecture, the speaker orated fervently: "He drove straight to his goal. He looked neither to the right nor to the left, but pressed forward, moved by a definite purpose. Neither friend nor foe could delay him, nor turn him from his course. All who crossed his path did so at their own peril. What would you call such a man?"

"A truck driver!" shouted a voice from the audience.—Forbe's Magazine.

### If So, Raise the Right Hand

Breathes there a man with a soul so dead
Who never to a cop has said,
When past the limit he has sped,
"Gee, why donchu pinch that guy ahead?"
—Motor Age.

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